



Thematic area:

Environmental Sustainability.

Priority: Management of resources and adaptation of practices to climate changes.

Need: Water management: Lack of management of water resources: how to use water better?; How to deal with lack of water?; How to manage the quality of rainwater?; How to store and redistribute water?; How to manage water, quantitatively and collectively?; How to deal with droughts?; How to reduce waste?; Information on financing and/or investments to preserve and better manage water resources

Solution EU number: CC-07.

Content of the solution: Design and implementation of adapted treatment systems to reduce nutrient and microbial pollution from equine farms.

Reasons for Implementing the Solution

Equine farms contribute to nutrient and microbial pollution of nearby water bodies due to runoff from pastures, manure storage, and enclosures. Efficient treatment systems reduce environmental impact and improve local water quality.

Description of Solution Strategies

Runoff and wastewater from equine farms can be managed through a combination of structural and biological treatment systems. Key components include drainage control, sedimentation areas, filtration systems, and compact wastewater treatment units.

Runoff from pastures is reduced through controlled fertilization, effective drainage, and dense vegetation cover. In areas with rich soil, sedimentation ponds or constructed wetlands can be installed in field streams to slow water flow and retain solids. These can be created more cost-effectively through damming instead of excavation and are often eligible for environmental aid funding.

Outdoor enclosures are shaped and sloped to promote surface runoff after rainfall, reducing standing water and preventing nutrient accumulation. Regular manure collection, particularly in rainy periods, further reduces nutrient loading.

To minimise pollution, clean rainwater and contaminated water flows should be kept separate. Contaminated water can be treated using:

- Soil filters, where runoff water passes through layers of sand. These filters retain phosphorus, but their efficiency declines over time and media replacement is required.
- Biochar filters, still under development, use pyrolyzed wood material. While nutrient retention is currently limited, multi-layer systems (e.g., biochar-sand combinations) have shown promising results in pilot studies treating areas up to 15–20 ha. Systems must be properly insulated to prevent freezing in winter. The cost for basic systems is relatively low (approx. €300–400).



Runoff and Wastewater Management Systems for Equine Farms

- Chemical treatment options include dosing with iron sulphate in drainage wells to reduce phosphorus levels.

For domestic-type wastewater, e.g. from wash areas or toilets, land-based filtration is standard. Pre-treated wastewater from a septic tank is led through sand or prefabricated filter material and discharged into a pit or into the ground. Where soil conditions are not suitable, small domestic treatment plants are used. These include:

- Activated sludge systems, with aeration and sludge recirculation.
- Batch systems, which operate intermittently once a defined volume is reached.
- Biofilters, where microorganisms grow on plastic media and treat the water.

Phosphorus is removed via filtration or chemical precipitation; nitrogen through nitrification and denitrification. All systems require regular maintenance, including sludge removal and chemical refills.

An alternative biological method is the root-cake treatment plant, using wetland vegetation such as lake reed, reed canary grass, or willows for water purification.

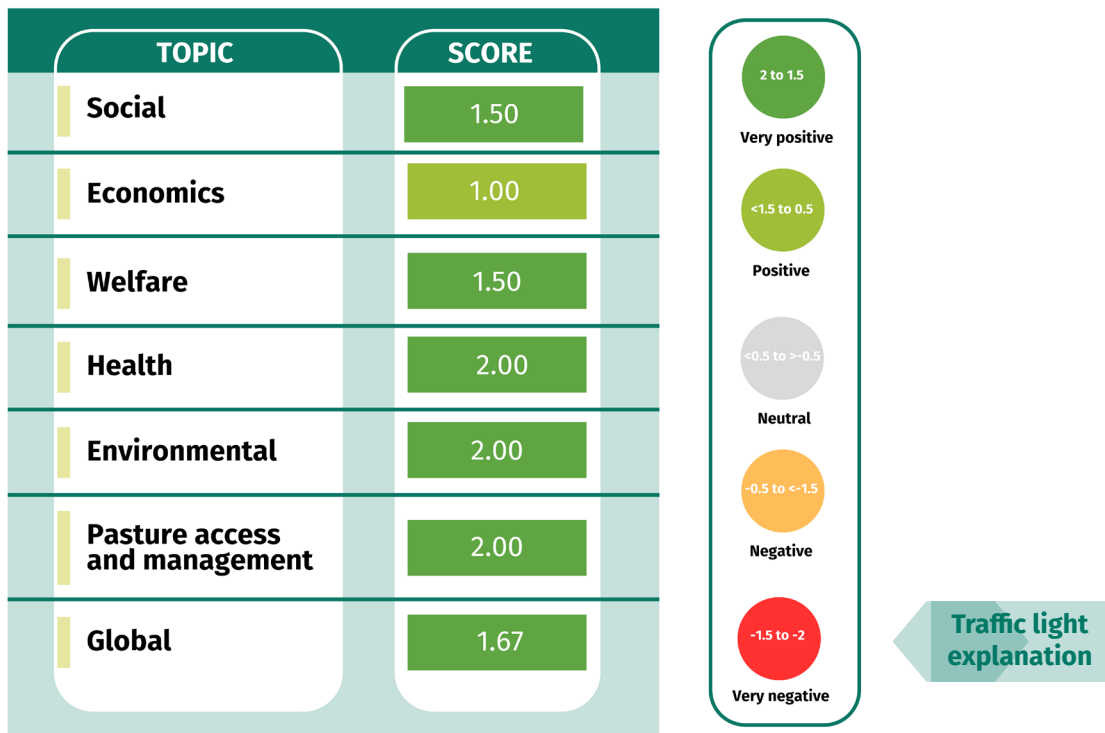
Implementation Steps

- 1. Site assessment:** Identify runoff sources, risk zones (e.g. near water bodies), soil type, and space availability using tools like the Simuhepo environmental guide.
- 2. Water flow management:** Separate clean rainwater from contaminated water streams; design enclosure slopes and drainage accordingly.
- 3. System selection:** Choose appropriate treatment methods based on site conditions – e.g. soil filters, biochar filters, sedimentation ponds, compact treatment plants.
- 4. Design and planning:** Size the system based on catchment area and expected load; plan insulation, maintenance access, and discharge points.
- 5. Construction and installation:** Install filters, ponds or plant-based systems; apply damming or excavation where needed; ensure winter protection where applicable.
- 6. Maintenance planning:** Set up regular checks, media replacement schedules (e.g. sand or biochar), sludge removal, and chemical replenishment if applicable.



Runoff and Wastewater Management Systems for Equine Farms

How Will this Solution Impact the Performance of your Farm?



Socioeconomics: This solution will support the social performance of the farm because it demonstrates environmental responsibility and strengthens public trust. Cleaner and drier paddocks improve working conditions for staff and create a more attractive environment for customers, enhancing the farm’s reputation. By proactively addressing water management, the farm also positions itself as a forward-looking actor in line with future environmental expectations.

This solution will support the economic performance of the farm because it can increase long-term land value, reduce erosion damage, and potentially open access to subsidies or funding. Although the system requires significant upfront investment, labor, and administrative efforts, it prepares the farm for future regulatory compliance. Over time, improved reputation and environmental alignment can contribute to competitiveness and economic resilience.



Health & Welfare: This solution has a positive impact on the overall health performance of the farm by helping to reduce pain and minimize the use of medication. By drying excessively muddy and manure-loaded paddocks and pastures, better hygienic conditions can be maintained. It also improves the farm’s welfare performance, as it contributes to a positive emotional state of the animals by providing more welfare-friendly living conditions (drier areas to stand and rest).



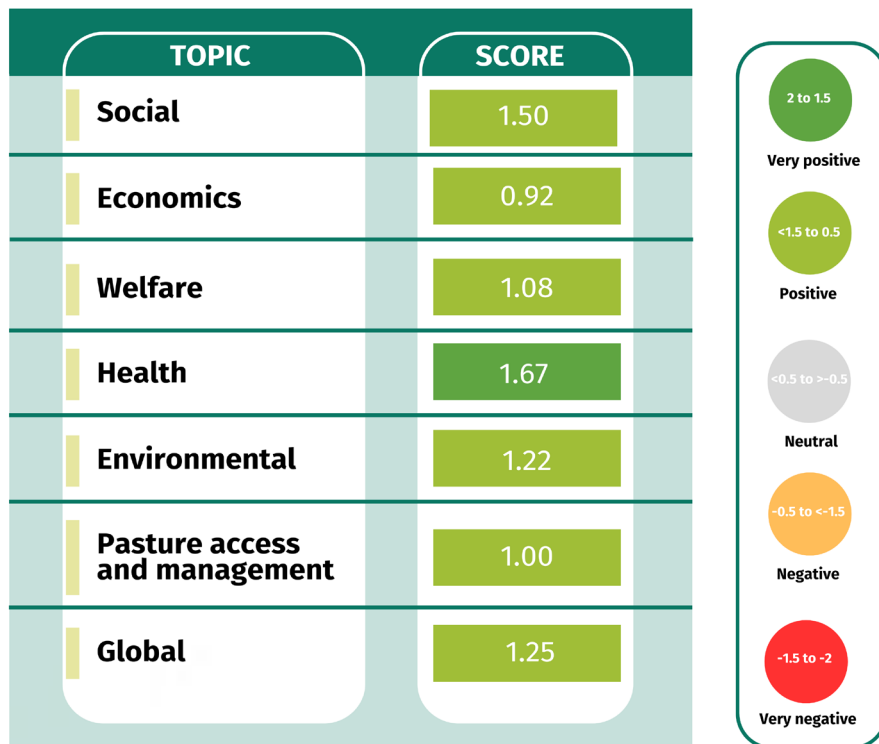
Technical Sheet for Solution Implementation

Runoff and Wastewater Management Systems for Equine Farms



Environmental sustainability: This solution will support the environmental performance of the farm because less nutrients in the run-off water have clear and significant positive effects on all environmental aspects. Water courses are maintained in better condition - less eutrophication and leakage of harmful substances such as medicine residues and other chemicals. This solution will support the land access or management performance of your farm because water courses are maintained in better condition.

How Will this Solution Impact the Resilience of your Farm?



Socioeconomics: This solution will support social performance of the farm facing external challenges assessed because proper water management improves hygiene, safety, and overall conditions for both horses and staff. Dryer and healthier environments promote animal welfare, reduce health risks, and create a more attractive setting for clients and visitors. By demonstrating responsibility and commitment to sustainable practices, the farm enhances its reputation and social acceptance. This solution will support economic performance of the farm facing external challenges assessed because effective water management increases efficiency, helps maintain forage and yields, and reduces costs linked to damage or inefficiencies. Although installation and upkeep require financial and labor investment, the system contributes to long-term savings, productivity, and preparedness for future requirements. It can also strengthen the farm's financial stability by supporting sustainable land use and opening opportunities for funding or incentives.



Runoff and Wastewater Management Systems for Equine Farms



Health & Welfare: If the farm faces external challenges, this solution positively impacts the farm’s health performance by reducing pain, mortality, and the need for medication through the assurance of hygienic conditions. As a result, farms that implement this solution become more resilient to external pressures. In addition, this solution strengthens the farm’s welfare performance under challenging conditions. By providing dry areas for standing and resting, it improves the living environment of equines, thereby enhancing their emotional well-being.



Environmental sustainability: This solution will support environmental performance of the farm facing external challenges assessed because of better water management and less erosion. This solution will support land access or management performance of the farm facing external challenges assessed because when fields are well drained, the yields and incomes increase.

How can this solution help your farm to face specific external challenges to be more resilient?

CHALLENGES	SCORE
Inflation	1.00
Pandemic	1.25
High welfare standard	1.50
High infectious diseases	1.42
Extreme weather event	1.42
Loss/limited access to grassland	0.83



Inflation & Social Crises: This solution will support the global performance of the farm facing inflation because efficient water management reduces repair costs, improves yields, and secures forage production, lowering exposure to rising input prices. Although it requires investment, the long-term efficiency gains strengthen overall resilience and economic stability.

Runoff and Wastewater Management Systems for Equine Farms

This solution will support the global performance of the farm facing pandemics because controlled water management helps limit disease transmission risks while maintaining safe, hygienic conditions for animals and staff. By reducing health vulnerabilities and supporting operational continuity, it contributes to stronger resilience in times of disruption.



Welfare & Diseases: This solution enhances the overall performance of the farm in the face of infectious diseases. It positively influences social, economic, health, welfare, and environmental priorities by ensuring better hygienic conditions and preventing the spread of waterborne infectious diseases. Likewise, this solution supports the farm's ability to adapt to compulsory high-welfare standards. It safeguards social, economic, health, welfare, and environmental priorities when the farm is required to comply with elevated welfare demands, including dry areas for standing and resting.



Climate Change & Access to Land: This solution will support the global performance of the farm facing abnormally low temperatures, excessive raining, windstorms and/ or floods. With intelligent water management it is possible to be prepared both very dry and very wet conditions. Wetlands can act as buffers in both cases. In the North, rainfall during winter months is estimated to increase, which requires effective erosion control.

Land access/management challenge: this solution will support the global performance of the farm facing loss or limited access to agricultural land because with proper management of water, even smaller area of land can provide the required forage / pastures for equines.



Runoff and Wastewater Management Systems for Equine Farms

Cost-benefit Analysis

Costs

Socioeconomics:

- Requires awareness, environmental knowledge, and commitment from equine farmers.
- Financial investments for planning, installation, and regular maintenance.
- Labour input needed for construction and ongoing care.
- Possible administrative efforts (e.g. permits, environmental assessments).
- Training or expert advice may be necessary for system design and operation.

Health & Welfare:

- Minor temporary disturbances for equines during construction activities.

Sostenibilidad medioambiental:

- Temporary deterioration of water quality during construction.
- Timing of construction must consider ecological factors (e.g. breeding seasons).
- Environmental assessments required in sensitive areas.
- Responsibility for proper disposal of used filter materials and sludge.



Benefits

- Improved public image and reputation of the equine sector as environmentally responsible.
- Long-term increase in property and land value.
- Potential eligibility for subsidies or environmental funding.
- Proactive compliance with future environmental regulations.
- Safer and cleaner working conditions for farm staff (dry and stable ground).
- Note: Benefits related to drier ground result mainly from proper drainage and enclosure design, not directly from water retreatment systems.



- Healthier and more comfortable equines due to dry and hygienic ground*.
- Reduced risk of mud-related issues (e.g. hoof rot, skin problems).
- Fewer veterinary interventions and lower associated costs.
- Note: Benefits related to drier ground result mainly from proper drainage and enclosure design, not directly from water retreatment systems.



- Significantly improved surface water quality.
- Reduced soil erosion and nutrient runoff into water bodies.
- Flood risk mitigation through better drainage control (if combined with drainage system).
- Supports local biodiversity and reduces eutrophication.



Technical Sheet for Solution Implementation

Runoff and Wastewater Management Systems for Equine Farms

Costs

- Risk of system underperformance if maintenance is neglected.

Cooperation between farms

- Potential for conflict over cost-sharing or differing priorities among landowners.
- Challenges in coordinating technical solutions (e.g. location of ditches, wetlands).



Benefits

- Contributes to climate resilience by stabilizing local water balance.
- Supports national and EU environmental goals.

- Shared investments reduce individual costs and increase efficiency.
- Strengthened dialogue and cooperation among neighbouring farms.
- Joint planning helps prevent future conflicts.
- Shared access to technical knowledge or machinery.
- Enables landscape-level solutions (e.g. shared buffer zones or treatment wetlands).

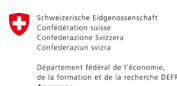
Additional Resources

Websites

- Finnish: Simuhepo – Simulaatiomallinnuksen avulla hevosalan ympäristövaikutukset hallintaan <https://www.hippolis.fi/simuhepo/>

Publications

- Finnish: Hamunen, S., Ruponen, J. Mäki-Tuuri, S., Mattila, E. Saastamoinen, M. 2023. Opas hevostallien vesistöllisten ympäristövaikutusten hallintaan. Hämeen ammattikorkeakoulu, Hippolis, hevosalan osaamiskeskus, Luonnonvarakeskus. 2023. <https://www.hippolis.fi/site/wp-content/uploads/opas-hevostallien-vesistollisten-ymparistoriskien-hallintaan-nettiin.pdf>



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Ideas to Animate a Workshop About the Solution

- Ask a supplier or manufacturer of water treatment systems, agricultural drainage experts, or an environmental advisor to sponsor the workshop.
- Find a model equine farm that has implemented water treatment systems (e.g. sedimentation pond, filter system, wetland).
- Prepare a small demo area (e.g. model filter bed, sediment trap) and involve participants in hands-on installation steps or mock-up planning exercises (e.g. slope design, water separation layout).

Proposed Structure for the Workshop on Runoff and Wastewater Management Systems for Equine Farms

1. Introduction to Runoff- and Wastewater Retreatment Systems

- What are runoff and wastewater retreatment systems?
- Why are they relevant for equine farms?
- Key components: sedimentation ponds, soil filters, biochar filters, small domestic treatment plants.
- Overview of types: constructed wetlands, sand filters, compact treatment units (activated sludge, batch plants, biofilters).

2. Benefits of Water Retreatment Systems in Equine Farms

- Environmental benefits: cleaner water bodies, reduced nutrient leaching, biodiversity protection.
- Operational benefits: structured water flow reduces muddy areas (if drainage is integrated), safer working conditions.
- Social/image benefits: more sustainable farming image, potentially eligible for funding.
- Animal health benefits (if paired with proper drainage): dry ground supports hoof and skin health.

3. Practical Applications on equine farms

- Separation of clean and dirty water streams.
- Shaping of outdoor areas to guide runoff.
- Location of filters and ponds near high-risk zones (e.g. manure storage, paddocks).
- Retreatment units for washing and stable water.
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4. How to Choose the most suitable system

- Assess farm layout, water flow, and runoff sources.
- Check soil types and proximity to water bodies.
- Consider available space, ecological restrictions, and budget.
- Compare options: passive (ponds/filters) vs. active (compact treatment units).

5. Hands-On Demonstration

- Live demonstration of a small-scale filter unit or sedimentation trap.
- Participants assess water samples (before/after treatment).
- Option to simulate layout planning with topographic maps or model kits.
- Show insulation methods for winter protection.



6. Maintenance and Troubleshooting

- How often to replace filter media (e.g. sand, biochar).
- Signs of malfunction or reduced efficiency.
- Safe disposal of sludge and filter residues.
- Seasonal maintenance (e.g. winterisation, vegetation control in wetlands).

7. Case Studies and Real-World Examples

- Present examples of equine farms that have implemented runoff or wastewater treatment systems (e.g. filter ditches, sedimentation ponds, compact treatment plants).
- Show before/after scenarios in terms of water quality, paddock conditions, and maintenance workload.
- Discuss practical challenges during implementation (e.g. space limitations, cost management, seasonal adjustments).
- If available, refer to regional or national guidance materials, such as checklists, planning tools, or evaluation forms used in farm assessments.

8. Cost Analysis and Return on Investment (ROI)

- Investment ranges (e.g. €300–400 for biochar filters, €5,000–10,000 for compact plants).
- Long-term savings through better water quality, reduced fines, improved image.
- Possible subsidies or funding programmes.
- ROI calculation examples based on farm size and system type.

9. Q&A Session

- Open forum for practical questions from participants.
- Discuss specific challenges (e.g. rocky soil, lack of space, shared water flow with neighbours).
- Clarify maintenance needs and system longevity.

10. Wrap-Up and Resources

- Summary of key takeaways.
- Distribute practical guides (e.g. local regulations, supplier catalogues).
- Provide contact info of sponsors, consultants, and product providers.
- Offer access to demo units, discounts or pilot support (if available).